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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,187	09/30/2003	David Beard	584-35597-US	5061

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EXAMINER

VARGAS, DIXOMARA

ART UNIT	PAPER NUMBER
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2859

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/675,187

Applicant(s)

BEARD, DAVID

Examiner

Dixomara Vargas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☒ Claim(s) 42 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/04/04; 04/05/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 1-15 and 40 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea) and is not directed to a practical application of such judicial exception (e.g., because the claim does not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result). The language in the claim suggest only a combination of instructions without reciting a structure associated to the procedure and lacks a tangible result and the end of the procedure.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2-3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 2 and 3, the claim language fails to define what the terms ηf and δf stand for in the equation.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-7, 11, 13-22, 26-34, 36-39 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Prammer (US 6,204,663 B1).

With respect to claims 1, 16 and 27, Prammer discloses a method (and therefore the means for executing the method) of estimating a property of interest relating to an earth formation comprising (Abstract): conveying a Nuclear Magnetic Resonance (NMR) logging tool into a borehole in said earth formation; applying a first pulse sequence having a first associated measurement frequency and measuring first signals corresponding to said first pulse sequence (Column 3, lines 59-67), said first signals including non formation non-NMR signals resulting from an excitation pulse, and, a refocusing pulse in said first pulse sequence (Columns 2 and 4, lines 11-50 and 6-33 respectively); applying a plurality of additional pulse sequences having associated additional frequencies different from each other and from said first frequency; measuring additional NMR signals resulting from applying said plurality of additional pulse sequences; and determining from said first and said additional measured signals an estimate of

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said property of interest, said estimate substantially unaffected by said non-NMR signals (Column 2, lines 23-67).

7. With respect to claims 2, 6, 17, 21 and 31, Prammer discloses the step wherein said first and said

additional frequencies are related by an expression of the form $\pi f \cdot \delta = \frac{2}{TE} = \frac{1}{TE/2}$ where TE is an interecho spacing (Column 4, lines 62-65).

8. With respect to claims 3, 7, 18 and 22, Prammer discloses the step wherein said first and said additional frequencies are related by an expression of the form $\pi f \cdot \delta = \frac{1}{TE}$ where TE is an interecho spacing (Column 4, lines 62-65).

9. With respect to claims 4 and 19, Prammer discloses the step wherein a phase of said non-NMR signals resulting from said first pulse sequence and phases of non-NMR signals resulting from said additional pulse sequences are substantially evenly distributed mound a unit circle (Column 2, lines 23-67).

10. With respect to claims 5, 20 and 34, Prammer discloses the step wherein at least one of said first pulse sequence and said additional pulse sequences comprises a CPMG sequence (Columns 3 and 4, lines 67 and 1-10 respectively).

11. With respect to claims 11, 26 and 36, Prammer discloses the step wherein determining the value of said property of interest further comprises summing said first and said additional measured signals (Column 2, lines 46-50).

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12. With respect to claims 13 and 37, Prammer discloses the step wherein the property of interest is at least one of (i) a T2 distribution, (ii) a TI distribution, (iii) a porosity, (iv) a bound fluid volume, and (v) a bound volume irreducible (Column 2, lines 23-34).

13. With respect to claim 14, Prammer discloses the step wherein said first and said plurality of additional frequencies are discretely sampled and wherein determining said value of said property of interest further comprises forming a weighted summation of said measurements at said first and said additional frequencies (Column 2, lines 46-50).

14. With respect to claim 15, Prammer discloses the step wherein said forming of said weighted summation further comprises minimizing a noise in an echo measurement (Column 2, lines 46-50).

15. With respect to claims 28-30, Prammer discloses said conveyance device comprising a wireline, drillstring of coiled tubing (Column 1, lines 52-59).

16. With respect to claims 32-33 and 38-39, Prammer discloses said processor is at a surface location or downhole location (Column 1, lines 52-59).

17. With respect to claim 41, Prammer discloses said non-NMR signal is at least one of (A) ringing resulting from an excitation pulse in said RF pulse sequences, and, (B) a ringing resulting from a refocusing pulse in said RF pulse sequences (Column 4, lines 6-33).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 8-10, 23-25, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prammer (US 6,204,663 B1) in view of Edwards (US 6,452,389 B1).

With respect to claims 8, 23 and 35, Prammer discloses the claimed invention as stated above in paragraph 4 except for the step wherein at least one of said first pulse sequence and said additional pulse sequences comprises a modified CPMG sequence having a refocusing pulse with a tipping angle of less than 180° . However, Edwards discloses the step wherein at least one of said first pulse sequence and said additional pulse sequences comprises a modified CPMG sequence having a refocusing pulse with a tipping angle of less than 180° (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have at least one of said first pulse sequence and said additional pulse sequences comprises a modified CPMG sequence having a refocusing pulse with a tipping angle of less than 180° as taught by Edwards with Prammer's method of estimating a property of interest relating to an earth formation for the purpose of having an improved SNR while consuming the same electrical power as taught by Edwards (Column 15, lines 10-27).

20. With respect to claims 9 and 24, Prammer discloses the step wherein said first and said additional frequencies are related by an expression of the form $\omega_f \cdot \omega_g = \frac{2}{TE} = \frac{1}{TE/2}$ where TE is an interecho spacing (Column 4, lines 62-65).

21. With respect to claims 10 and 25, Prammer discloses the step wherein said first and said additional frequencies are related by an expression of the form $\omega_f \cdot \omega_g = \frac{1}{TE}$ where TE is an interecho spacing (Column 4, lines 62-65).

Allowable Subject Matter

22. Claims 12, 40 and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

23. The following is a statement of reasons for the indication of allowable subject matter:

a. With respect to claim 12, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a method of estimating a property of interest relating to an earth formation comprising the step wherein said first and said additional signals have a signal loss of less than 0.8% relative to a signal that would be obtained at a nominal frequency corresponding to said first and said additional frequencies in combination with the remaining limitations of claim 1 above.

b. With respect to claim 40, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a method of estimating a property of interest relating to an earth formation comprising the step wherein said first and said additional frequencies are related by an expression of the form

$n_f \cdot \delta f = \frac{m}{t}$ where δf is a separation of frequencies, n_f is the number of frequencies, m is any integer that is not a multiple of n_f , and t is a time over which a phase difference evolves in combination with the remaining limitations of claim 1 above.

c. With respect to claim 42, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest a NMR apparatus for

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use in a borehole of an earth formation comprising a processor wherein in said processor said first and said additional frequencies are related by an expression of the form

$nf \cdot \delta f = \frac{m}{t}$ where δf is a separation of frequencies, nf is the number of frequencies, m is any integer that is not a multiple of nf , and t is a time over which a phase difference evolves in combination with the remaining limitations of claim 16 above.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in the PTO 892 discloses MR systems that register ringing noise and suppress said signal.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (571) 272-2252. The examiner can normally be reached on Monday to Thursday from 8:00 am. to 4:30 pm..

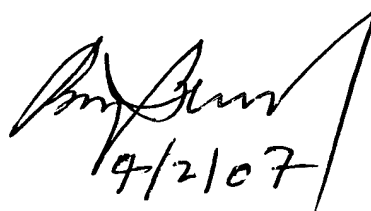
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Dixomara Vargas
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BRIJ SHIVASTAV
PRIMARY EXAMINER